
The lack of binaries among hot horizontal branch stars: M80 and NGC5986

C. Moni Bidin¹, S. Moehler², G. Piotto³, Y. Momany³, A. Recio-Blanco⁴,
and R.A. Méndez¹

¹ Departamento de Astronomía, Universidad de Chile, Chile

² European Southern Observatory, Garching, Germany

³ Dipartimento di Astronomia, Università di Padova, Italy

⁴ Observatoire de la Côte d’Azur, Dpt. Cassiopée, France

1 Introduction

Extreme horizontal branch (EHB) stars play an important role in extragalactic astronomy, since they have been individuated as possibly being responsible for the UV upturn in elliptical galaxies and in the bulges of spiral galaxies, that has been proposed as an independent age indicator for this type of galaxies. In recent years the “binary scenario”, in which EHB stars formation is related to dynamical interactions inside binary systems, has been proposed as the main channel for their formation. In fact [1] indicated that $69 \pm 9\%$ of field EHB stars should be close binary systems with short periods $P \leq 10$ days. Nevertheless, more recently [5] found a noticeably lower binary fraction (40-45%), and [2] found no evidence of binarity among 18 EHB stars in globular cluster NGC6752. They estimated that within a 95% confidence level the close binary fraction in EHB of this cluster should be lower than 20%.

Here we present preliminary results of the extension of the previous survey.

2 Results

Observations, data reduction, radial velocity (RV) measurements and error analysis were performed as in [2]. Systematic errors must still be rigorously measured, but the corrections applied here should be within 2-3 km/s from the true value. Our results are plotted in Figure 1.

The most prominent result is that again we fail to detect the high RV variations observed among many field EHB stars. We conclude that there is no *clear* evidence of binarity in the samples, although we individuate a possible exception in M80. This star shows a modest (31 km/s) but statistically significant (nearly 5σ from zero) variation, and we consider it an interesting

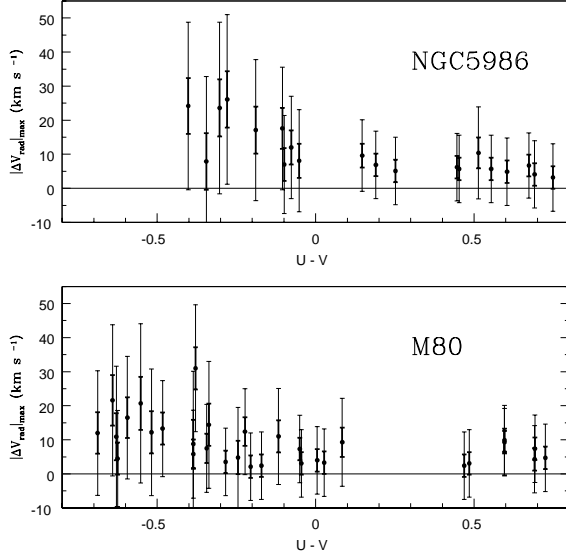


Fig. 1. Maximum RV variation observed for each target in 4 nights of observations, as a function of color U-V. Photometric data are from [3] and [4]. The thick errorbar indicates the 1σ interval, the thin one the 3σ . Each night we collected up to two spectra per star but observations on M80 were undersampled due to string wind from north.

candidate, although the variation is not high enough to rule out the possibility that it is due to some distortion induced by noise. In NGC5986 we find one variation slightly higher than 3σ (26.1 ± 8.3 km/s, i.e. 3.1σ), but it is not trustworthy due to the low S/N of the spectra. Such a variation is statistically reasonable among the great number of our measurements, it is hard to consider it significant. No further conclusion can be drawn at the moment.

In our sample we analyzed 11 EHB stars in M80. Our observations fix the best estimate for the close binary fraction $f=15\%$. Unfortunately it is not a strong constraint because of the poor temporal sampling, that lowered the sensitivity of the survey. Statistically considering our observations and results, the probability that $f \geq 48\%$ is lower than 10%, enough to rule out the high f observed by [1] but not the intermediate one found by [5].

In NGC5986 we observed 5 EHB stars. The sample is too much small to attempt any statistical consideration, but the result again points out a lack of close binaries, even in the presence of one candidate, because in this cluster our survey reaches a high detection probability (80% on average).

We can then conclude that in both clusters the general lack of close binaries among EHB stars is confirmed.

References

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